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CLAIMS

1. An isolated nucleostemin polypeptide, comprising
5 an amino acid sequence at least 85% identical to SEQ ID NO: 2,
wherein the polypeptide regulates differentiation or proliferation of a cell.
2. The isolated nucleostemin polypeptide of claim 1, wherein the
polypeptide comprises an amino acid sequence set forth as SEQ ID NO: 2 or a
10 conservative variant thereof.
3. The isolated nucleostemin polypeptide of claim 1, wherein the polypeptide
comprises an amino acid sequence set forth as SEQ ID NO: 4 or a conservative
variant thereof.
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4. The isolated nucleostemin polypeptide of claim 1, wherein the polypeptide
comprises an amino acid sequence set forth as SEQ ID NO: 2 or SEQ ID NO: 4.
5. The isolated nucleostemin polypeptide of claim 1, comprising an amino
20 acid sequence at least 90% identical to SEQ ID NO: 2.
6. The isolated nucleostemin polypeptide of claim 1, comprising an amino
acid sequence at least 90% identical to SEQ ID NO: 4.
- 25 7. The isolated nucleostemin polypeptide of claim 1, comprising an amino
acid sequence at least 95% identical to SEQ ID NO: 2.
8. The isolated nucleostemin polypeptide of claim 1, comprising an amino
acid sequence at least 95% identical to SEQ ID NO: 4.
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9. The isolated nucleostemin polypeptide of claim 1, comprising an amino
acid sequence at least 99% identical to SEQ ID NO: 2.

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10. The isolated nucleostemin polypeptide of claim 1, comprising an amino acid sequence at least 99% identical to SEQ ID NO: 4.

5 11. The isolated nucleostemin polypeptide of claim 1, comprising an amino acid sequence at least 85% homologous to SEQ ID NO: 2, wherein amino acid number 45 is an arginine.

10 12. The isolated nucleostemin polypeptide of claim 1, further comprising an amino acid sequence 100% identical to one of (a) amino acids 61-87 of SEQ ID NO: 2, (b) amino acids 61-87 of SEQ ID NO: 4, or (c) amino acids 61-87 of SEQ ID NO: 6.

15 13. The isolated nucleostemin polypeptide of claim 1, further comprising an amino acid sequence set forth as one of (a) amino acids 177-180 of SEQ ID NO: 2, (b) amino acids 177-180 of SEQ ID NO: 4, or (c) amino acids 177-180 of SEQ ID NO: 6.

20 14. The isolated nucleostemin polypeptide of claim 1, further comprising an amino acid sequence set forth as one of (a) amino acids 256-263 of SEQ ID NO: 2, (b) amino acids 256-263 of SEQ ID NO: 4, or (c) amino acids 256-263 of SEQ ID NO: 6.

25 15. An isolated polynucleotide encoding the polypeptide of claim 1.

 16. The isolated polynucleotide comprising a sequence as set forth as SEQ ID NO: 1, a degenerate variant thereof, SEQ ID NO: 3, or a degenerate variant thereof.

30 17. The isolated polynucleotide of claim 1, operably linked to a promoter.

 18. An expression vector comprising the isolated polynucleotide of claim 1.

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19. The expression vector of claim 18, wherein the vector is a viral vector.
20. An isolated host cell transfected with the polynucleotide of claim 1.
- 5 21. The isolated host cell of claim 20, wherein the host cell is a eukaryotic cell.
22. The isolated host cell of claim 20, wherein the host cell is a prokaryotic
- 10 cell.
23. A method for inducing differentiation or inhibiting proliferation of a cell, comprising
- altering the level of a nucleostemin polypeptide comprising an amino
- 15 acid sequence at least 80% identical to SEQ ID NO: 6 in the cell,
- thereby inducing differentiation or inhibiting proliferation of the cell.
24. The method of claim 23, wherein altering the level of the nucleostemin polypeptide comprises increasing the level of the polypeptide.
- 20 25. The method of claim 23, wherein altering the level of the nucleostemin polypeptide comprises decreasing the level of the polypeptide.
26. The method of claim 23, wherein the nucleostemin polypeptide
- 25 comprises an amino acid sequence set forth as SEQ ID NO: 6.
27. The method of claim 23, wherein the nucleostemin polypeptide comprises an amino acid sequence set forth as SEQ ID NO: 4.
- 30 28. The method of claim 23, wherein the nucleostemin polypeptide comprises an amino acid sequence set forth as SEQ ID NO: 2.

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29. The method of claim 23, wherein the nucleostemin polypeptide has a sequence set forth as SEQ ID NO: 10.

30. The method of claim 23, wherein the cell is a tumor cell.

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31. The method of claim 23, wherein the cell is *in vitro*.

32. The method of claim 23, wherein the cell is *in vivo*.

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33. The method of claim 23, wherein altering the level of the nucleostemin polypeptide comprises increasing transcription of a nucleic acid sequence encoding the nucleostemin polypeptide.

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34. The method of claim 23, wherein altering the level of the nucleostemin polypeptide comprises altering the amount of the polypeptide bound to p53.

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35. The method of claim 23, wherein altering the level of the nucleostemin polypeptide comprises introducing into the cell a small inhibitory RNA that specifically binds a polynucleotide encoding the nucleostemin polypeptide.

36. The method of claim 23, wherein the cell is a stem cell.

37. A method of screening for agents that affect differentiation or proliferation of a cell; comprising
25 contacting p53 and a nucleostemin polypeptide comprising an amino acid sequence at least 80% identical to SEQ ID NO: 6 with an agent of interest *in vitro*; and

 evaluating binding of p53 and the nucleostemin polypeptide; wherein a decrease in the binding of p53 and the nucleostemin polypeptide as compared to a
30 control indicates that the agent affects differentiation or proliferation of the cell.

38. The method of claim 37, wherein the control is a standard value.

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39. The method of claim 37, wherein the control is the binding of p53 and the nucleostemin polypeptide in the absence of the agent.

5 40. A method of inducing senescence of a cell, comprising
 altering the level of a polypeptide comprising an amino acid sequence
at least 80% identical to SEQ ID NO: 6, thereby inducing senescence of the cell.

10 41. The method of claim 40, wherein altering the level of the nucleostemin
polypeptide comprises increasing the level of the polypeptide.

42. The method of claim 40, wherein altering the level of the nucleostemin
polypeptide comprises decreasing the level of the polypeptide.

15 43. The method of claim 40, wherein the nucleostemin polypeptide
comprises an amino acid sequence set forth as SEQ ID NO: 6.

20 44. The method of claim 40, wherein the nucleostemin polypeptide
comprises an amino acid sequence set forth as SEQ ID NO: 4.

45. The method of claim 40, wherein the nucleostemin polypeptide
comprises an amino acid sequence set forth as SEQ ID NO: 2.

25 46. The method of claim 40, wherein the nucleostemin polypeptide
comprises an amino acid sequence set forth as SEQ ID NO: 10.

47. The method of claim 40, wherein the cell is a tumor cell.

30 48. The method of claim 40, wherein the cell is a stem cell.

49. The method of claim 40, wherein the cell is *in vitro*.

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50. The method of claim 40, wherein the cell is *in vivo*.

51. A method of decreasing proliferation of a tumor cell in a subject,
comprising administering to the subject a therapeutically effective amount of an
5 agent that alters the level of a nucleostemin polypeptide comprising an amino acid
sequence at least 80% identical to SEQ ID NO: 6, thereby decreasing proliferation
of the tumor cell in the subject.

52. The method of claim 51, wherein the agent is a small inhibitory RNA
10 that specifically binds a polynucleotide encoding the nucleostemin polypeptide.

53. The method of claim 51, wherein the agent is a polynucleotide encoding
a nucleostemin polypeptide.

15 54. The method of claim 51, wherein the agent is a p53.

55. A method for inducing differentiation, inducing senescence, or inhibiting
proliferation of a cell, comprising
altering the level of a nucleostemin polypeptide comprising an amino
20 acid sequence set forth as SEQ ID NO: 10 in the cell,
thereby inducing differentiation, inducing senescence or inhibiting
proliferation of the cell.

56. The method of claim 55, wherein the cell is a tumor cell.
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57. The method of claim 55, wherein the cell is *in vitro*.

58. The method of claim 55, wherein the cell is *in vivo*.

30 59. The method of claim 55, wherein altering the level of the nucleostemin
polypeptide comprises increasing transcription of a nucleic acid sequence encoding
the nucleostemin polypeptide.

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60. The method of claim 55, wherein altering the level of the nucleostemin polypeptide comprises altering the amount of the polypeptide bound to p53.

5 61. The method of claim 55, wherein altering the level of the nucleostemin polypeptide comprises introducing into the cell a small inhibitory RNA that specifically binds a polynucleotide encoding the nucleostemin polypeptide.

10 62. The method of claim 55, wherein the cell is a stem cell.

63. An antibody that specifically binds the polypeptide of claim 1.